

Chapter 13

Forestry or “The Art of Flying Blind”. Sustainability in an Era of Global Change

Ulrich Schraml and Roderich v. Detten

Introduction

Sustainable development has become the most important normative landmark for international environmental policy. Since the UN World Commission on Environment and Development's report *Our Common Future* (also called the “Brundtland Report”),¹ and the 1992 Rio Earth Summit, many policy programmes have not only claimed that they seek economic development, social justice in distribution, and ecological sustainability, but also that they take the needs of future generations into account in their work. Thus, a mission statement for business and policy efforts was formulated that became consensually accepted by the broad majority of stakeholders. Many authors consider sustainable development of societies to be the sole alternative to their collapse.²

For foresters, the discovery of this principle by governments, organisation, and business is a renaissance of the much older identical forestry term dating back to the search for common welfare-oriented forest-use concepts of the eighteenth century.³ In the forest literature, special legislation, and technical planning of the period, the principle of sustainable utilisation of nature is commonly associated with the postulate of multi-functional forests,⁴ indicating a conviction that various simultaneous forest uses should be made possible. Accordingly, sustainability has been a central principle in forestry for about 250 years, describing a well-balanced

U. Schraml
Institute of Forest and Environmental Policy, University of Freiburg, Germany

R.v. Detten (✉)
Institute of Forest Economics, University of Freiburg, Germany
e-mail: r.v.detten@ife.uni-freiburg.de

¹WCED 1986.

²Diamond 2005; Constanza et al. 2007.

³Schanz 1996.

⁴Wagner 2004; Suda 2005.

relationship between nature and the people who use it. Many authors classify the concept of forest sustainability as a model for other social fields.⁵

Although, forest sustainability is inseparably linked to the demands of diversified future forest use, prior to examining the nature of these links, the degree of congruence between the definitions of sustainability within and beyond the forest sector must be ascertained. Specifically, which features of the discussion regarding forest sustainability – if any – can be used in the ongoing political debate?

Above all, scientific discussion and policy discourses have to be clearly distinguished because the more popular the term “sustainability” becomes, the more prone the scientific, ecological, and economic content will be to getting lost. In fact, the term “sustainability” is so imprecise and ambiguous, that in the course of policy discussions, it can easily be shaped according to interests and political intentions.⁶ In addition, social scientists, for instance, consider the term inadequate as a “model” because it neither offers a clear diagnosis of problems nor suggests directives for dealing with them.⁷ With respect to societal and to scientific ascertainment, putative deficits in applying measures of sustainability are sometimes cited as criticism.⁸

Similar problems arise when the term “sustainability” is applied to forestry. Although highly relevant to scientists and practitioners, it only rarely impacts on the management of forest production. Thus in the ongoing process of integrating new demands on forests, the existing ideal of forest sustainability has become so complicated that implementation can hardly be achieved.⁹ Moreover, it is pointed out, that this traditional term, which was conceived as a guideline, tends to lose relevance in situations that have become characterized by uncertainty and risk due to Global Change. Some of the long-term strategies that have heretofore been associated with forest sustainability are presently being questioned as a result of the growing complexity of forest use and the lack of any reliable prognosis.¹⁰ Similar to the postulate of multifunctional forestry, this principle is susceptible to dwindling to “meaningful idle talk”.¹¹

Against this backdrop, the authors have reflected on the contradiction that on the one hand, the traditional approach of sustainability provides strategies for future forestry planning, while on the other hand, adaptive strategies serve as the foundation for recommendations to address the growing uncertainties and risks of forest production.

Initially, the following paper is going to describe the relevance of the term “sustainability” for forestry and, above all, will respond to its symbolic meaning to the actors. Further, supported by data from a current empirical study, decisive

⁵ e.g. ÖBF 2008.

⁶ Höltermann and Oesten 2001.

⁷ Brand and Fürst 2002.

⁸ Grunwald and Kopfmüller 2006.

⁹ Volz 2006.

¹⁰ Detten 2003.

¹¹ Suda 2005.

strategies are presented regarding how forest enterprises and forest policy can deal with and prepare for future forest use. Based on this analysis, conclusions are drawn on how to approach sustainability in forestry and suggestions are drafted for the further development of the term “sustainability” and the strategies based upon it.

The Concept of Sustainability and the Compensation of Uncertainty and Contingency

As mentioned above, the term “sustainability” is one of the most successful and commonly used terms in the global environmental and economic debate of the last few decades; at the same time, though, it is among the fuzziest and most ambiguous of terms. There is no contradiction in this – on the contrary, the reason for its enormous popularity lies in the fact that the term “sustainability” is seemingly self-explanatory and can be used as an almost universal projection screen while simultaneously enjoying strong and widely accepted positive connotations. Everybody seems to know what sustainability means or what sustainable development requires. In any case, the term “sustainability” symbolizes the opposite of negatively connotative terms like “depletion”, “destruction”, and “exhaustive exploitation”.

Its non-specific breadth, however, leaves the term in danger of becoming vapid and hollow – a critique that has been widely expressed during the last few decades. In fact, looking at the use of the term in the political realm or in the context of popular and fashionable phenomena like “LOHAS” – “Lifestyle of Health and Sustainability” – the arbitrary, if not spurious, use of “sustainability” often comes to the point where the originally intended meaning is contradicted. In the case of LOHAS, the original idea of a gentle, prudent utilization of natural resources has turned into stimulation of consumption with the consequence that in this particular context, “sustainability” has reduced to an economic label.

The term “sustainability” is highly symbolic – it incorporates a multitude of hopes, deep concerns, expectations, moral demands, and provides compensation, orientation, and even meaning for a global society in a situation where modern life is characterised by deep-rooted changes, conflicts, risks, and uncertainties.

Not by chance, sustainability has become a pivotal term in modern “Risk Society”.¹² As traditional explanations of the meaning of life have become questioned, the search to recover the meaning of life has resulted in a multitude of specific modern offerings (consumption, science, sports, the cult of the body, arts, nature, etc.). Rhetorical compensation strategies are obvious indicators of crises of meaning,¹³ and they accompany modern times in a multitude of forms¹⁴: explicit discourses of

¹² Beck 1992.

¹³ Bolz 1997.

¹⁴ Bolz 2001, 118ff.

meaning, the recollection or evocation of unifying values,¹⁵ a cult of identity, the invention of tradition, and especially the “ideology of nature”.¹⁶ Within all these modern discourses about environmental, political, and economic challenges and risks, sustainability has become a modern formula for *ars vivendi*, the art of living, marking a way out of the situation of uncertainty and crisis and compensating for the feeling of permanently excessive demands.

In the case of forestry, the situation seems to be clearer and simpler. Since the “invention” of “sustainability” as part of the foundation myth of modern forest sciences and which has been made tangible as a management “principle” that addresses practical silvicultural and economic problems, its meaning is seen as part of the knowledge and know-how of forestry, which has evolved from a craft to a business sector with its own scientific branch. On closer inspection, however, long-term forest management is characterised by at least four fundamental problems that lead the decision maker in forestry to a paradox or at least a problematic situation¹⁷:

- The realistic “modelling” of the forest ecosystem and its growth is the basis for successful production planning and control. However, due to the natural dynamics and complexity of forest ecosystems, the modelling reaches its limits¹⁸ and (scientific) knowledge about the future development of the forest ecosystems is not available.
- With regard to the long-term nature of forest production, the findings of modern ecology, the unpredictable risks and environmental changes, and the non- or bounded rational behaviour of forest decision makers, the target-oriented and long-term steering of forest ecosystems has to be put into question.¹⁹
- With respect to the multitude of complex, contradictory, and permanently changing social demands on forests, a consistent, stable, and harmonious target system seems illusory.²⁰
- With regard to permanent social change, the role and task of forestry is also permanently changing, which in turn leads to a permanent crisis of legitimation.

Against the background of these fundamental problems, the essence of forestry’s dilemma can be characterised as the necessity of making decisions with long-term effects and implications against the background of ecological complexity and uncertainty, as well as permanent social change. In order to legitimise or justify management and planning strategies, this dilemma has to be met by compensational strategies. Traditionally, the term “sustainability” implies the maintenance of the potentials, functions, and values of forests with regard to the needs and expectations of the current and future generations. Again, the term bears an almost unlimited

¹⁵ Bolz 1997, 78f.

¹⁶ Bolz 1997, 16 and 2001, 179ff.

¹⁷ in detail see Detten 2001, 15ff.

¹⁸ Höltermann 2001, 42ff.

¹⁹ Kramer 2000, 131ff.

²⁰ e.g. Mann and Essmann 1998.

potential for identification and provides an ideal projection screen that helps to mitigate the harsh demands of the combination of long-term decisions, contingency, and complexity.

Sustainable forest management’s claim of providing an overall concept or “principle” manifests all the features of a true paradox,²¹ a contradiction in terms: the attempt to plan for rational management decisions under circumstances and constraints that render rational long-term management impossible. The principle or assertion that sustainability should guide today’s management (and actually does, according to most of the decision makers in forestry) seems highly questionable in light of the fact that assessment of “factual sustainability” can only be made in a future period of more than a 100 years. To act “sustainably”, we have to know and define as “sustainable” what can only be known and defined as “sustainable” in retrospect.

It is, however, not possible to tell with certainty which “successes” or “failures” over a period of time can be attributed to forest management planning and which should be attributed to other influencing factors (“external circumstances”).

The logical contradiction between the given situation of uncertainty and contingency on the one hand, and the claim to make the future predictable and available (which “sustainability” implies) on the other, is sharpened by the phenomenon of global change. If we accept a fundamental uncertainty resulting from permanent social and environmental change, does it make sense to speak about sustainability, which implies stability and assessment over long periods of time? Can “sustainability” be reasonably and operationally defined? Are there management concepts in forestry that can reasonably be considered as “sustainable”? Is it possible to use “sustainability” as an attribute, feature, or quality rather than as a nebulous assertion?

The question of how to define the concept of sustainability is, at the same time, inseparable from the central and crucial question of forestry, namely: how to cope with the long term.²²

Future Orientations in Contemporary Forestry

The Shaping Force of Future Concepts

It is not only in forestry that the idea of “the future” has changed radically since the Middle Ages. Everything that medieval people considered more or less predetermined has undergone a sweeping conceptual change since the beginning of modern times. Contemporary thinking principally conceives of the future as an

²¹ see e.g. Hughes and Brecht 1978; Watzlawick et al. 2000, 171ff or Baraldi et al. 1997, 131.

²² Hoogstra 2008.

empty and therefore mouldable space that can be filled with projects and concepts. A sense of creative leeway has developed that is constantly growing. “Anything is feasible in the future” is the slogan we are confronted with from the mouths of politicians and business. Against this backdrop, the social scientist Uerz (2006) even diagnosed “an attack by future against past and present times” while researching how terms like “future viability”, “future security”, “future prospects”, and “future technology” influence politicians, scientists, and businesspeople in their preparation for the requirements of the coming decades.

Overall, the scientific conclusions have been disappointing. An analysis of the stakeholders’ rhetoric about the future reveals a lot about the present situation but surprisingly little about their plans for future. The slogans of ad writers dominate the public discourse and keep the topic alive in our memories while simultaneously veiling the currently inadequate methods of early diagnosis and strategic planning.

It must be admitted, however, that many of the circulating concepts about the future have had an important impact. How the future is predicted has consequences for how we perceive and interpret the present. Hence, we constantly collide with the signs of the proclaimed change. The current weather conditions serve as the harbinger of the heralded climatic catastrophe. The current demand for wood-burning fuel is used as an indicator for tomorrow’s prognosticated energy provision. The concepts of the future are the glasses through which we analyse the present and serve as orientation for the actions of individuals, business, and politics. Speculations on the future might therefore be used to stimulate or put a brake on measures. They are the driving force – when climatic disasters exercise pressure – behind adjustments in personal lifestyles and corporate practices. They might also develop an effect of either relief or delay. If positive change is expected, then it may be considered that present problems need not be solved, especially if it seems that they will disappear with better days. Against this backdrop, concepts about the future can act as a driving force or a brake on policy processes.

Environmental policy, with its special relevance for forest use, is determined by apocalyptic visions generated in cooperation with science and the media. Striking pictures of our planet’s future branded by dead forests, biodiversity loss, and climate incidents fuel the political stakeholders’ views and, therefore, exercise influence on the future. Future concepts are potent whether well founded or not. Every concept of the future that prevails in the competition for scientific or media attention influences future events because it serves as partial basis for the actions of national stakeholders, enterprises, and society. As a result, the subjective, probably mistaken, notions of the future formed during the period of negative future visions in the seventies and the “no future-era” of the eighties affect our future because administrative structures, special legislation, and pressure groups that came into existence based on them shape the framing conditions of our present lives.

Thus, the question of whose subjective future concept might prove competitive enough to prevail is of the highest relevance. Today’s politics affect tomorrow’s living conditions and economy. Potentially self-fulfilling prophesies have become an instrument to assert political power and advantage. Forecasting impending disaster creates the solidarity necessary for demanding sacrifices and the reformulation of

stakeholder constellations. The warlords and politicians who use the debate on climate change and demographic issues for their own purposes are well aware of that.

Studies of future orientation in forestry analyse the sector’s approach toward uncertain developments and, perhaps logically, the findings are ambivalent. Surveys among stakeholders in the field of forestry confirm that the future constitutes an important if not overriding consideration in contemporary decision making. They state that silvicultural decisions in particular are future orientated – an observation that should come as no real surprise to foresters. Surprisingly, some studies reveal that efforts to come to grips with the future are based on notions that are less clear and long range than one might expect. Uncertainty and unpredictability are predominating factors in foresters’ attempts to develop a vision of a future with which they seek to be able to cope and concerning which they make decisions.

Basically, the routines established by foresters help make the future appear more secure.²³ This is achieved, among other means, by extrapolating observations from the past and present to the future. A famous example is the cultivation of pine for mining purposes. In times of strong demand of plywood for pits, it was assumed that the need would persist, and this influenced silvicultural planning. Today, there are few pits left, but extensive pine plantations remain, a situation that no longer corresponds to the demands of contemporary society.

Another approach to future planning involves shortening the time perspective. A comparative study in Germany and the Netherlands found that planning horizons comprising more than 10–15 years do not influence pending decisions.²⁴ As one of the foresters stated in an interview: “Ten, twenty, or thirty years is a very long time if you take the number of impending changes and uncertainties into account”. Nevertheless, the ongoing discourse on the orientation of silviculture often refers to forest planning, confidently assuming that existing goal-orientated tools of forest management are reliable and that not even storms can affect this apparently solid management concept.

In times of change, how is it possible to foresee how enterprises and society might use their forests in 20, a 100, or a 150 years? The survey makes clear that foresters are repeatedly forced to deviate from long-term planning. In the German example, 95% and in the Dutch case 98% of foresters admitted that they had to adjust their planning occasionally or even more frequently. At first glance, planning in both countries seems to be approached in a similar way, but in fact, the employees of forest enterprises in the two lands behave somewhat differently, as manifested in various details that emerged. Apart from reactions to natural disasters like storm or snow damage, the equally important economic, organisational, and societal framing conditions apparently engender varying approaches. In the German enterprises scrutinised, changes on the timber market were a reason to deviate from the original planning, while in the Netherlands, unexpected budget cuts made the state forest administration drop its planning efforts at the time. And, notably, in the Netherlands,

²³ Hoogstra and Schanz 2008b,c.

²⁴ Hoogstra and Schanz 2008a.

changing societal framing conditions very often led to abandoning original forest planning. As a result, it seems that goal-orientated management is full of pitfalls in times of constant natural, societal, and economic change. Nevertheless, the findings concede that the current typical regional patterns of impact factors will certainly not last forever. Where today calamities and the timber market may dictate the rhythm, tomorrow might be determined by societal restrictions – or the other way round.

Overall, the studies reveal surprisingly few differences between Germany and the Netherlands despite these countries having been selected because of their very different planning traditions: more or less non-existent in the Netherlands, in contrast to Germany's long history of sophisticated efforts in the field. Apart from the subtle distinctions mentioned, the conclusions reached are the same for both countries: long time-horizons are hardly relevant for forestry decision making.

Current Orientation in German Forestry vis-à-vis the Future

Information on the contemporary concepts of German stakeholders in regard to the future of forestry can be found in research carried out as part of the project “Waldzukünfte 2100” (The Future of the Forest: 2100).²⁵ On the basis of a national survey among forest owners, forest administrators, nature protection agencies, and the timber industry, forestry science data on future prospects was collected to identify strategies developed by the respective sectors. With the help of this data, the statements on forest and forestry made by different actors were analysed with respect to their origin, consistency, homogeneity, and continuity. The double-staged survey, carried out in November 2007 (N = 640; 36% response rate) and February 2008 (N = 399) produced estimates of different actor groups that is presented here in brief.

The interviewees had to judge the factors that might have impact on future forest utilisation. They were given a list of topics in order to assess whether the imminent challenges would increase or decrease over the time period until 2020. The list contained hotly debated issues from the recent past (air pollution, certification, nature reserves) and current issues (climate change, innovation, commodity availability) that covered the fields of society, economy, technology, and environment and that are relevant for forest policy in Germany.

It was striking that in 90% of the cases, the experts actually made a statement about what would happen up to 2020. The category “not possible to answer” was rarely ticked. This might indicate that many experts have concrete ideas about how the future will be, but it also reveals a lot about the course they assume past and present phenomena will take. With respect to the topics addressed, further conclusions can be made. The interviewees expected, almost unvaryingly, increasing significance for all factors mentioned. Economic and technical factors, as well as policy decisions, were expected to be the driving forces of future development. Moreover, the demand

²⁵ Mickler et al. 2008.

for timber, the globalisation of forest markets, and climate change were consistently identified as relevant factors. In addition, the survey makes clear that notions of futures are susceptible to the influence of daily politics, which is why the issues originating from the current forest policy discourse are rated as being highly relevant with respect to the future. Last but not least, climate change and its impacts were classified as a central future scenario.

The assessment of the relevance of other topics is less consistent. In particular, “the willingness to pay for infrastructure”, “civic participation”, “air pollution”, and “the social acceptance of timber” split the sample of the survey into two large groups with contrasting expectations. These were the only topics where a significant number of interviewees expected decreasing significance.

It is striking that predominantly societal factors were subject to a split assessment. In contrast to “hard” economic factors, which received a uniform rating, “soft” factors were obviously considered as less decisive for the future orientation of forest use. The broad variety of answers concentrated on past controversies of forest policy, which had no notable impact on forest use. Accordingly, the interviewees drew analogous or similar conclusions when they took the previous lack of impact into account while rating future prospects.

Finally, in the assessment of the central challenges to forestry, the interviewees were asked to estimate which interests might prevail in German forest policy until the year 2020. Corresponding to the three classical dimensions of sustainability, ecological, economic, and societal factors were targeted. Again, a clear majority gave definitive answers. Although, a tenth of experts believed that it was impossible to answer these questions, the other 90% expressed a clear opinion on this topic. Most of them believed that economic interests would prevail. Ecological or even societal concerns were considered less important.

This is a recurrent phenomenon. As outlined above, economic factors are not only considered being of special relevance but also, according to the interviewees, they rule over the future – in this case at least until the year 2020. Those who thought that economic interests would prevail represented the majority in each of the different groups of interviewees. Even the environmentalists assume that their ecological issues will become less significant by 2020.

Moreover, the interviewees were asked to rate the likelihood that several statements on the situation of German forestry and timber industry might come true by the year 2050. Developments taken for granted were mixed with those about which opinion is divided. For example, substantial doubt was expressed that voluntary intervention would become significant, or that vast expanses will be occupied by wilderness or nature reserves. Similarly, it was deemed unlikely that the timber industry’s output would remain stable. The interviewees unanimously saw little chance that the future of forestry and the timber industry would be determined by intelligent technology, high demand for timber, rising timber prices, innovative wood products, and an intensive use of wood for fuel.

Comparing this data to that referring to the year 2020, only a small number of interviewees did not express a confident opinion. The category “not possible to answer” was only selected by a minority. The question concerning unmanaged forests was

not answered by only 1.4%; the question concerning the segregation of forest use by 2.5%; and that about voluntary engagement by 6.3%. All the other interviewees produced more-or-less confident statements on what the future will bring over the next 40 years. The scientists were the most self-assured in their judgements. Compared to the other groups, they ticked the category "is most likely to happen" with respect to the year 2050 most frequently.

The statements for 2050 are closely connected to those of 2020. There are no significant inconsistencies with respect to future expectations. On the contrary, the stated dominance of economic interests is theoretically presumed to be likely for both periods, until 2020 and until 2050. Even for the latter date, the predominance of economic issues is anticipated, and for most of the interviewees, it seems farfetched that they might be politically overruled by environmental issues or social concerns. The most heterogeneous were the answers to the questions concerning a complete change of structure with regard to land use or property.

The shared confidence that current trends would come true led to inconsistencies in the views of the future outlined. These trends (rising forest use, increasing demand for recreation, and spatial focus of forest functions) were foreseen as being valid in 2050; at the same time, however, it was assumed that the dominating general principles, e.g. sustainable multi-functional forestry, would live on and apply 2050 as well. As a result, the interviewees accepted the validity of the general principle of combined forest uses as well as spatial segregation.

The findings allow statements about future concepts that the actors interviewed were judged as accurate. On the whole, they corresponded to the global change challenges identified. Minimising the operational risk seemed to be the most crucial concern. Intensified hunting of hoofed game, fostering the variety of structure and biodiversity stands, and the planting of foreign wood species were considered to be adequate means to achieve this. Moreover, the instruments of strategic corporate management were seen as helping to preserve access to the forest markets. According to the findings of the survey, special attention should be paid to the two most promising corporate strategies, namely, public relations and communication and cooperation with other forestry enterprises in the production and marketing sector.

In summary, it can be stated that the different groups of actors harbour very similar expectations concerning the future and concentrate on the economic and technical sectors. These are well developed and described in detail. Many interviewees are confidently looking forward to their expectations concerning silvicultural, technical, and organizational strategies coming true. Exactly these strategies were considered to be the most important responses to the challenges identified.

Similar concepts for further development in the area of social forest functions are not detectable. Most of the interviewees thought that conflicts over forest use would increase due to the increasing societal demand for forest services. In contrast, the ideas of different forest uses among the public are barely developed and weakly advocated. The notion of future forest use accounts for the biggest gaps with regard to societal use of forests. Instead, the view is dominated by techno-scientific visions

of the future. New products and process innovations are seen as important driving forces for future development, but the crucial parts of the puzzle, which carry the knowledge about societal and political concerns and markets, are missing. There is no comprehensive vision that describes the future of forest use in Germany.

Sustainability and the Anticipation of Future – Uncertainty as a Decision-Making Problem

A surprising result of Hoogstra’s aforementioned study (2008) on the future orientation of forest practitioners is that the future does not play the role in their decision-making processes that might have been expected. While most decision-making problems in forestry have long-term effects, foresters, who regard themselves as experts and guardians of long-term sustainable management, do not consider periods of more than 15 years when planning.

Against this background, the result of the survey among forest experts with regard to their specific knowledge about future trends and developments becomes less surprising. Even in the perception of forest experts, the future remains an open question in at least some crucial fields of activities – a trivial fact at most.

There is widespread uncertainty concerning the possible development of factors that effect or are crucial for the success of long-term decisions in forest management and production. These include growth conditions, the business environment, and the regulatory framework.

The uncertainty not only refers to the level of factual basic conditions of forest management, but also to the level of its normative foundation: values, principles, and goals behind forest management such as social demands or the meaning and content of sustainability.

Following theoreticians of sustainability like OTT (2002), sustainability is primarily a moral principle. On an abstract level, a future orientation in organising today’s private life and economic activities is founded in moral obligations towards future generations and their way of living (intergenerational justice). In contrast to arbitrary goals or socio-cultural concepts (like justice), the regulatory idea of sustainability is, however, said to connect its moral claim with a target-oriented teleological perspective. Sustainability appears as a goal whose achievement is regarded as a moral obligation. Sustainability thus becomes a tangible and approachable principle that is capable of guiding action in connection with a specific concept.

At this point, there are at least two levels of uncertainty²⁶ that lie behind the task of coping with the long term as well as behind the term of sustainability.

²⁶Various taxonomies address the terms “uncertainty”, “risk”, and “ignorance” (e.g. Ravetz 1990; Jaeger et al. 2001). We therefore use the term “uncertainty” with a rather unspecific meaning, implying a lack of subjective or objective security and the lack of knowledge.

These should be considered separately because they refer to two different decision-making processes:

- a. Uncertainties about guiding values and norms (normative uncertainty)
- b. Uncertainties about the decision environment. This refers to the lack of future knowledge about the external or environmental factors influencing management decisions (cognitive uncertainty)

Sustainability as a Moral Claim – the Future as a Problem of Normative Uncertainty

As described above, the concept of sustainability must be understood as a moral principle that claims to achieve intergenerational justice.²⁷ The “definition” presented in 1987 by the World Commission on Environment and Development (Brundtland Commission), which has become widely accepted, puts this moral principle into a simple sentence: “Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.” The vision of intergenerational justice is rather abstract, since there is no definite standard or criterion allowing us to define what has to be regarded as a worthy or adequate “heritage” from today’s population to future generations.

The evaluation of the “heritage” (in accordance with an expanded concept of sustainability that not only includes natural capital but also economic achievements and social institutions) remains a permanent social negotiation process. The potential difference between the evaluation criteria of the current generation and those of future generations remains as well.

There is no simple directive or principle to resolve the tension between the necessary cultural utilisation and transformation of the environment and the conservation of the environmental or natural capital.²⁸ The image of “natural capital” that can be obtained on a “constant” basis (“strong sustainability”²⁹), implying existing limits of substitutability, replaceability, and physical limits to natural resources, and to the stability and resilience of ecosystems (which in itself is a rhetorical construct) presupposes a static, fixable “normal” status of resources and services provided by existing ecosystems. However, the problem of the norms and values behind the assessment of the quality or value of natural resources is unavoidable.

²⁷ Ott 2002, 5ff, Renn 2002, 211.

²⁸ Renn 2002.

²⁹ Daly 1999; Ott 2002.

Sustainability as Strategic Planning – the Future as a Problem of Cognitive Uncertainty

In addition to normative uncertainty, the existing forecasting process is beset with uncertainty. This is due to the complexity and dynamics of the natural (growth conditions, risks) and social environments (change of demands and requirements, change of lifestyle, changes in societal values). Consequently, there is a lack of knowledge with which to answer the questions connected to today's decisions. It is impossible to calculate the different effects of today's various decisions on tomorrow's environment, economy, and society.

The unknown future effects of global warming in different scenarios, for example, knowledge regarding future assimilation capacities of ecosystems, carbon-sink functions, cycles of material, the resilience of ecosystems, the sensitivity of species, populations, etc., towards disturbances,³⁰ etc. is not available. In other words, knowledge about the determination of the natural capital, as well as knowledge about the most effective and efficient way of investing in natural capital, is missing. Additionally, in times of rapid global change, experiences, know-how, and practical knowledge about successful and “sustainable” management of ecosystems is rapidly devolving, together with the change of the natural conditions. As a result, a static and non-procedural determination or definition of sustainability or sustainable management fails. The moral claim of sustainability meets cognitive uncertainty about the way to find suitable indicators for its operationalisation.

Peterman and Peters (1998) summarise the sources of uncertainties that exist in management of forest ecosystems as follows:

“First, natural variability over space and time is inherent in ecological processes. For example, growth rates of trees and animals may differ among sites, years, and individuals. Such natural variability makes it difficult to forecast responses of ecological systems to different management actions with accuracy or precision. Variability in human behaviour also makes it difficult to forecast how human harvesters and industry will respond to management regulations. Second, further uncertainty exists in data because sampling techniques imperfectly estimate quantities such as density of a certain bird species in a forest, volume of merchantable timber present per hectare, or natural mortality and reproductive rates of mammals. These methods thus create further imprecision and bias in estimates of quantities that vary naturally. Therefore, managers will forecast imperfectly, making it more difficult to achieve a given management objective. Third, management objectives are frequently uncertain, either because they are not well defined or because they change over time. These uncertainties create complications for managers who try to choose the best management option. The challenge for resource managers is how to fully

³⁰ Ott considers knowledge about these factors as necessary preconditions for an effective and efficient investment in natural capital (Ott 2002, 11).

account for the type, direction, and magnitude of uncertainties when making management decisions.”³¹

If there is insufficient knowledge to positively determine the operational contents and criteria of sustainability, and if knowledge of ecological systems is not only incomplete but elusive³² and uncertainties are inevitable, learning from experience is the only practical approach to direct forest management in a “sustainable” way.

The Art of Flying Blind – Adaptive Management as a Means to Sustainability

If global change has a lesson to teach, it is that we should cast doubts on the image of (forest) ecosystem management as a target-oriented, rational steering process in which the principle of sustainability plays the role of a “guiding star” that gives orientation and directs forest management strategies. The future remains clouded in uncertainty. We neither can agree on the heritage we are able and obliged to bequeath to future generations, nor can we answer the question of which heritage future generations want to inherit. Even if we were able to agree on a common sustainability goal, a common sustainability strategy towards the goal, and criteria to evaluate sustainability, we would lack the complex knowledge needed to forecast the evolutionary dynamics of our natural and social environment that would enable us to steer the whole system to our goal successfully.

In a complex and dynamic situation, ecosystem management is more an art of flying blind under difficult conditions. No matter whether the passengers’ views on the destination are contradictory and changing, and that there is no visibility and the weather is stormy, the pilot’s task is to keep the plane steady and stable and not to stray from the proper course. The pilot’s strategy has to depend on more than a good map and the willingness to reach the airport. The explicit acknowledgement and acceptance of the limits of understanding and the risks that accompany decisions undertaken in the face of such uncertainty are inevitable.³³

With regard to the problem of uncertainty and contingency, the need for a flexible trial-and-error strategy and a strategy of “muddling through” in contrast to linear-deterministic planning concepts has found both acceptance and rejection. An integral part of a “science of muddling through” is the “strategy of disjointed incrementalism” (Charles E. Lindblom), understood as a step-by-step and gradual course of action, not following a rational, long-term strategy focused on optimum solutions. Instead of concentrating on setting targets and developing a catalogue of guiding parameters, requirements, or standards, the interest is directed towards the organisation of the decision-making process and the correction of the shortcomings

³¹ Peterman and Peters 1998, 105.

³² Walters and Holling 1990.

³³ Stankey et al. 2005, 58.

of previous decisions.³⁴ If the future is uncertain, the perception has to be directed towards the unforeseen – and a strategy of muddling through has to be much more successful than a strategy of sustainability and anticipation.³⁵ The ability to make the most of an opportunity to improve or to change established practices or decision models becomes more important than the strength to follow a target-oriented strategy. Risk awareness and a sense for complexity replace utopian models of an ideal future. The term “resilience” stands for criteria of elasticity, flexibility, and responsiveness and means the ability to react promptly to unforeseen occurrences. This is indispensable for the preservation of a social system in the modern world.³⁶

In this regard, the concept of adaptive management³⁷ may be crucial – and should have been integrated into the sustainability concept. In a “working definition”, Nyberg defines adaptive management as “a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Its most effective form – ‘active’ adaptive management – employs management programs that are designed to experimentally compare selected policies or practices, by evaluating alternative hypotheses about the system being managed. The key characteristics of adaptive management include:

- Acknowledgement of uncertainty about what policy or practice is “best” for the particular management issue
- Thoughtful selection of the policies or practices to be applied
- Careful implementation of a plan of action designed to reveal the critical knowledge
- Monitoring of key response indicators
- Analysis of the outcome in consideration of the original objectives
- Incorporation of the results into future decisions³⁸

The main idea behind the concept of adaptive management is a quasi-reflexive restabilisation of management via feedback loops or feedback control, where the monitoring of key indicators leads to the readjustment of strategies, decisions, or decision-making processes in order to establish a permanent learning process. It is a strategy to learn from practical experiences and to change practices accordingly. Stankey et al. (2005) define the key element of adaptive management as the importance of design and experimentation, the crucial role of learning from policy experiments, the iterative link between knowledge and action, the integration and legitimacy of knowledge from various sources, and the need for responsive institutions.³⁹

Instead of an anticipation of the future, the pursuit of stability, and the development of long-term sustainability strategies, qualities like variability, error-friendliness

³⁴ Lindblom 1980, 491.

³⁵ Bolz 2001, 105.

³⁶ Lindblom 1980, 489.

³⁷ Holling 1978; Walters 1986; Peterman and Peters 1998.

³⁸ Nyberg 1998.

³⁹ Stankey et al. 2005, 6.

(the willingness to use errors and failures as starting points for necessary adaptation), and the eagerness to experiment with alternative management solutions should be considered as sustainable or future-proof capacities. In this respect, irritations, mistakes, failures, and deviances from the expected are necessary experiences since they are seen to hold potential for innovation. Irritations have to be examined with specific interest, as well as the internal variety of different and dynamic ways of interpretation, understanding, and acting, which have to be deliberately perceived, demanded, and integrated into the management process. The external environmental complexity and dynamics have to be mirrored by an increase in internal (organisational/ institutional) complexity. In this regard, the strategy of adaptive management means more than a simple “learning-by-doing” premise. Learning processes derive from explicit and purposeful monitoring, experimentation and testing, a critical processing of the results, and an active reassessment of the policy context in the light of the newly acquired knowledge.⁴⁰

In its form of “active-adaptive management”, the strategy of adaptive management as purposeful incorporation of uncertainties via feedback and learning processes explicitly integrates experimentation and feedback control into policy and management design and implementation.⁴¹ According to Kusel et al., “Active adaptive management is designed to provide data and feedback on the relative efficacy of alternative models and policies, rather than focusing on the search for the best predictor”.⁴² The strategy of adaptive management not only addresses the problem of cognitive uncertainty, but also the problem of normative uncertainty by regarding the process of iterative learning as a socio-political action as well as a technical-scientific undertaking. Integrated adaptive management processes apply to scientists, resource managers, and the public. They aim for the integration of discussions among the stakeholders about values, goals, objectives, and management options to address both the technical and social responsibility value-based dimensions of management problems. Learning in this regard is both a technical and social process,⁴³ beginning with an adequate framing of problems.

The question of how to design and structure an adaptive management process is, however, to be answered in relation to the specific context of the management problem – “adaptive management requires explicit designs that specify problem-framing and problem-solving processes, documentation and monitoring protocols, roles, relationships, and responsibilities, and assessment and evaluation processes”.⁴⁴

Since guidelines to aid managers, scientists, and policy makers in designing useful adaptive management models are still lacking, various open questions and tasks remain for further research on the topic of “dealing with uncertainty” using an adaptive approach:

⁴⁰Stankey et al. 2005, 7.

⁴¹Kusel et al. 1996.

⁴²Stankey et al. 2005, 13.

⁴³Stankey et al. 2005, 19f.

⁴⁴Stankey et al. 2005, 57.

- The analysis of best practices or successful examples of effective application of adaptive management concepts in practice⁴⁵
- The development of governance concepts and political decision-making procedures with the inclusion of adaptive management processes on different levels of action
- The analysis of institutional barriers impeding effective implementation of adaptive management processes
- The further development of concepts for organisational learning in the face of uncertainty and risk
- The further development of risk-management strategies for organisations in order to manage uncertainty and threats
- The development of concepts for including varying forms and sources of knowledge into the adaptive management and decision-making process
- Do the rejection of long-term sustainability strategies and the focussing of the concept of sustainability onto adaptive management strategies imply the risk of an “anything goes” or “laissez faire” approach? In other words, is the role of guiding moral principles like sustainability placed in question?

If adaptive management is understood and implemented as an iterative process with explicit hypothesis testing, monitoring, and evaluation of management experiences, the moral claim behind the concept of sustainability is present in the ongoing evaluation processes. Consequently, “sustainability” should be understood as a “boundary term”⁴⁶ whose purpose is to function as a “negative reference concept”, where the permanent discursive operationalisation brings up different values and normative positions. Renn (2002) has discussed various forms of the discursive determination and implementation of political goals and management targets for a mix of formal decision rules (decision making by formal decision-making rules e.g. majority voting system). Muddling through processes (incremental decision-making processes on the basis of minimum consensus) and participatory political discourse develops requirements for governance processes and political steering.⁴⁷

Mistrusting a steering optimism and long-term sustainable management strategies in a context of uncertainty and an open future does not lead to the reverse conclusion regarding an opportunistic arbitrariness and irresponsibility. On the contrary, even the condition of global change and the failure to promise possible solutions for environmental problems require political discussions, the adaptation to a situation of risk and uncertainty, pragmatism, and the trust in learning abilities.

⁴⁵ e.g. Ladson and Argent 2002.

⁴⁶ The concept has been coined in reference to the term of “boundary object” which has been originally introduced by Star and Griesemer (1989) to describe objects that serve as an interface between different communities of practice. Boundary objects are entities shared by several different communities but viewed or used differently by each of them.

⁴⁷ Renn 2002: 27ff

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